Docket No. 50325-0754   Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Confirmation No. 6843

    Keith McCloghrie, et al.   Group Art Unit No.: 2661

Serial No.: 09/106,519   Examiner: Bob Phunkulh

Filed: June 29, 1998

For: SAMPLING PACKETS FOR NETWORK MONITORING

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<u>**REPLY TO OFFICE ACTION**</u>

Sir:

In response to the Office Action mailed May 6, 2004, the shortened statutory

period for which runs until August 6, 2004, please reconsider the subject application in

view of the following remarks.

Applicants thank the Examiner for allowing claims 3, 5, 6, 22-24, and 27-28. In

this response, no claims have been amended, cancelled, or added. Claims 3, 5-7, and 9-

44 are pending in the application.

I. STATUS OF CLAIMS

The Office Action rejects claims 7, 10, 25-26, 29, 31 and 43-44 under 35 U.S.C. §

103(a) as allegedly unpatentable over U.S. No. 5,315,580 to Phaal (hereinafter "Phaal")

in view of U.S. Pat. No. 5,559,801 to Lo (hereinafter "Lo"). Applicants respectfully

traverse the rejection.

Claims 9, 11-21, 30, and 32-42 are objected to as being dependent upon a rejected

base claim.

II. INDEPENDENT CLAIMS 7 AND 29

Claim 7 recites a method that requires

adaptively altering a fraction of said packets for selection;
wherein said steps for adaptively altering a fraction of said packets for selection
    include steps for
        maintaining a queue of selected packets; and
        altering said fraction in response to a length of said queue.

Claim 29 includes a similar language. Thus, in claims 7 and 29, (1) a queue of selected

packets is maintained, and (2) the fraction of the queue of selected packets that is

sampled is varied according to the length of the queue. Claims 7 and 29 are at least

generic to a queue of varying length. A queue of varying length would be accommodated

by the method of claims 7 and 29 by altering the fraction of the packets for selection in

response to the new length.

The Office Action stated,

it would have been obvious …to replace the receive and transmit FIFO buffers 25
and 26 of Phaal with the queue 110 and queue control 112 of Lo in order to
provides the queue system with ability to monitor the length of queue when
storing the sampled packets -thus avoid overloading the traffic sampling element
by stopping or decreasing the sampling rate.

The Applicants disagree. The above passage of the Office Action implies that queue 110 stores a queue of data packets. This is incorrect. Queue 110 of Lo holds values of sampling intervals, and does not hold actual data packets. In contrast to queue 110, receive and transmit buffers 25 and 26 hold data packets. In other words, queue 110 stores a series of numbers, referred to as "COUNTS" or "sampling intervals" in which each COUNT represents the number of packets to count before sampling the next packet, whereas the queue of claims 7 and 29 hold packets.

Lo (column 7, lines 35-45) explains,

The data sampling system also periodically routes selected sample packets to management unit 30 according to a specified *set of sampling intervals, referred to as a sampling schedule*. The term `periodically` means that the data sampling system selects more than one sample packet but less than all data packets. The term periodic does not necessarily mean that the all the sampling intervals are equal. In some applications, it may be preferable that sampling intervals be somewhat `random` and of different durations to produce the most accurate statistics...(emphasis added).

Lo samples data packets at periodic intervals that are chosen to have a random length so that statistics are more accurate. Lo does not actually describe the algorithm for the random number generator for choosing the interval lengths. However, Lo discloses how to store the series of numbers generated by an algorithm (typically a random number generator) for generating interval lengths for performing sampling and sampling the packets at the intervals indicated by the in the stored list of intervals. Lo refers to the list of sampling intervals as a "schedule" further implying that the contents of the queue 110 is not packets, but a schedule of intervals at which to sample a packet (e.g., sample a packet after the 100th, 186th, 287th, and 454th packets) (see also column 7, lines 35-39 regarding the sampling "schedule"). To implement the selection of the sampling intervals, Lo uses queue 100. Lo explains (at column 10, lines 20-33),

Queue 100 is implemented as a first-in first-out (FIFO) buffer 110 controlled by a queue controller 112. FIFO 110 *stores up to N number of sampling intervals* (SAMP_INT$_x$, X=1 to N). FIFO 110 logically maintains an order of the sampling intervals, from a least recently entered value (SAMP_INT$_1$,), to a most recently entered value (SAMP_INT$_N$). In response to an assertion of the LOAD signal, queue 100 writes the value of SAMP_INT$_1$ into register 102. SAMP_INT$_1$ is written into register 102 as COUNT. COUNT is decremented in response to each assertion of the DECREMENT signal, with COUNT also provided to comparator 104. When COUNT equals zero, comparator 104 asserts the SAMPLE signal...(emphasis added).

Similarly, Lo (at column 10, lines 34-43) explains

When the SAMPLE signal is asserted, controller 55 shown in FIG. 5 asserts the LOAD signal after the sampled data packet is retransmitted to the management port, if the sampled data packet was valid. The assertion of the LOAD signal advances *the sampling intervals in queue* 100. Generally, advancing queue 100 results in queue controller 100 discarding SAMP_INT$_1$ and substituting SAMP_INT$_x$ with SAMP_INT$_{x+1}$, for X=1 to N-1. Thereafter, the process proceeds with COUNT equal to the new value of SAMP_INT$_1$ that was originally stored in SAMP_INT$_2$...(emphasis added).

Queue 100 stores a series of numbers (COUNTS) represented by the variables SAMP_INT$_x$. The value of the most recent SAMP_INT$_x$ is written into register 102 as the variable COUNT. Each time another data packet is transmitted by repeater 28, value of COUNT in register 28 is decremented. Once COUNT is decremented to zero, comparator asserts a SAMPLE signal, and a packet is therefore sampled. Consequently, sampling queue 100 stores the initial values of the variable COUNT, which are used by register 102 to determine which packet to sample next, and sampling queue 110 is not a queue of data packets. Presumably, the name chosen for the variables SAMP_INT$_x$, is chosen as a mnemonic, and is short for SAMPling_INTervals. Thus, in contrast to claims 7 and 29, the values stored in the sampling queue are not data packets, but values of the intervals at which sampling is performed.

There are many other indications that sampling queue 100 stores the values of intervals for performing sampling and not data packets. For example, column 12, lines 33-35 recite, "a sampling queue for storing a first value identifying a first sampling interval". Column 12, lines 49 and 50 state, "sampling queue stores a second value identifying a second sampling interval". Additionally, Lo states,

> The sampler has a microprocessor interface, allowing the microprocessor to write selected values into the sampling queue. *These values each represent a sampling interval.* When each sampling interval expires, the data packet sampling system transmits a packet to the management unit...(emphasis added, column 5, lines 14-19).

> In operation, a microprocessor loads *the sampling queue with various values representing sampling intervals* selected according to some selection algorithm. The particular selection algorithm chosen is dependent upon many factors and plays no particularly relevant part in the present invention, other than providing the actual *sampling interval values.*
> *The sampling queue is loaded with these values* [i.e., the sampling interval values] and the traffic on the network is monitored. Every time that a valid data packet is received, the value corresponding to the least recently added position of the sampling queue is decremented. When this value equals zero, a sampling signal is asserted. The sampling signal controls retransmission of the data packet to a management unit. When the sampling signal is asserted, the repeater sends the data packet to the management unit. When the sampling signal is deasserted, the repeater transmits a disrupted packet to the management. The disrupted packet is discarded by the management unit, with undisrupted packets processed...(emphasis added, column 5, lines 20-37).

> Additionally, the present invention includes features for resetting the sampling queue, and providing for various default operational modes. In one embodiment, a single value stored in the *sampling queue results in continued sampling at the specified interval.* This mode is desirable when a user does not require variation in the sampling interval. This mode has an advantage in not requiring continuous attention from the management unit to update the *sampling intervals...* (emphasis added, column 5, lines 48-56).

Each of the above passages refers to the "sampling queue" storing sampling "intervals" and not as storing packets sampled, in contrast to the queue of claims 7 and 29.

The Office Action (at page 3) argues,

> Lo, on the other hand, one implementation of the reset function in the preferred embodiment provides for changing the sampling intervals written into the sampling queue. ...(see col. 5 line 56 to col. 6 lines 3).

The Office Action (at page 5) further states,

> Claim 7 clearly cited "altering said faction in response to a length of said queue." Lo discloses this feature in col. 5 lines 57 to col. 6 line 3, which cited the following:

> One implementation of the reset function in the preferred embodiment provides for changing the sampling intervals written into the sampling queue. In some instances, network traffic may be too light when compared to sampling intervals written into the sampling queue. In these instances, too few sampling packets will be processed. Therefore, the preferred embodiment provides for resetting the relatively large sampling intervals with smaller values by overflowing the sampling queue with the newer values. When full, values written into the sampling queue replace existing values. By writing a sufficient number of new values, the actual number required depending upon *the size of the sampling queue* and values stored in the queue, new sampling intervals are established (see col. 5 line 56 to col. 6 lines 3).

> Therefore, Lo discloses altering a fraction of packets for review that is response to a length of a queue of selected packets. (The emphasis is in the original.)

The Applicants disagree. Column 5, line 56, through column 6, line 3, does not disclose that the size of the sampling queue changes. Although Lo discloses " writing…a number of new values…depending upon the size of the sampling queue", Lo never discloses altering the number of new values written. One of ordinary skill would have understood that the size of the queue is fixed and that the number of new values written is also fixed. Additionally, even were Lo to disclose altering the size of the sampling queue, changing the size of the "sampling queue" in Lo would not suggest altering the fraction of packets selected in response to the size of a queue of packets, because the queue of Lo is a queue

of values of sampling intervals (e.g. values directing the sampler to sample the 3000th,

6044th, 5005th, and 10,007[th] packet), and not a queue of packets sampled.

The operation referenced by the Office Action is also described at column 11,

lines 20-32, which states,

> When queue control 112 detects that FIFO 110 is full, new values that are attempted to be written may have different effects on operation of sampler 75. In the preferred embodiment, writing a new sampling interval value into FIFO 110 causes the value in SAMP_INT$_1$ to be discarded, the sampling intervals to be advanced in FIFO 110, and the present value in register 102 to be immediately overwritten with the least recently written sampling interval value. The preferred embodiment thereby permits readjustment of sampling intervals, such as may be desirable if initial sampling intervals are too large when applied to a network with light traffic. Other embodiments are possible, such as discarding the top value of FIFO 110 without overwriting register 102, or preventing FIFO 110 from being overflowed....

In other words, under certain circumstances, Lo finds it desirable to choose a new set of

sampling intervals (intervals at which packets are sampled). The manner in which Lo

updates the queue storing the intervals at which the packets are sampled is by writing

over the old list. The relevance of the "size of the sampling queue [the queue of intervals

at which the packets are sampled]" (in the above passage cited by the Office Action) is

only that the larger the queue the more values need to be written over, but the size of the

queue is fixed and never changes. Consequently, the number of values written into the

queue is never altered. In contrast, in claims 7 and 29, in response to a length of a queue

of packets the fraction of packets sampled is altered. Thus, not only is the queue in Lo

not a queue of packets, Lo also does not suggest "altering" a fraction of packets sampled

in response to a length of a queue, because Lo's queue is fixed in size.

The above passage cited by the Office Action also refers to "the sampling

intervals written into the sampling queue", implying that the queue is a queue of intervals

and not of packets. If one of ordinary skill had desired to use sampling queue 110 of Lo

within the system of Phaal, they would have used the sampling queue 110 in place of

ROM 22, because both ROM 22 of Phaal and queue 110 of Lo store COUNTS that are

used to determine the sampling interval, in contrast to the combination suggested by the

Office Action.

If one were to replace buffers 25 and 26 of Phaal with the sampling queue 110 of

Lo, as suggested by the Office Action, the resulting device would be inoperative, because

the modified device of Phaal would store a queue of sampling intervals, $SAMP\_INT_x$ or

COUNTS, instead of storing a queue of packets, and therefore would not have any stored

sample packets on which to perform statistics. The $SAMP\_INT_x$'s or COUNTS do not

contain the packet headers from which the statistical information is gathered, and

therefore the proposed modification to Phaal would not have been obvious (Cf. MPEP

2043.02, p. 2100-127, the sections entitled, THE PROPOSED MODIFICATION

CANNOT RENDER THE PRIOR ART UNSATISFACTORY FOR ITS INTENDED

PURPOSE").

> Phaal (at column 6, lines 5-9) teaches
>
> the occasional overflowing of the receive buffer 25 is not of major consequence
> since losing a packet will generally have minimal effect on the statistical
> measurements being conducted by the network monitoring system.

Hence, Phaal teaches that since a random sampling of packets is desired, loosing an

occasional packet as a result of the queue of packets being too long is not a problem.

Whereas Phaal suggests sampling after every ninety nine[th] packet (column 6, lines 37-

39), Lo suggests sampling one out every 3000 or 4000 packets (column 4, lines 43-47),

which would further reduce the likelihood of loosing packets due to the queue of packets

being too short. However, one of ordinary skill would have expected that loosing an

occasional packet would only increase randomness of the packets sampled, and would

therefore improve the statistics. Thus, in contrast to claims 7 and 29, Phaal teaches away

from altering the sampling process in response to the length of the queue of packets that

were sampled and stored in buffers 25 and 26. As stated in MPEP 2141.03, p. 2100-122,

> **PRIOR ART MUST BE CONSIDERED IN ITS ENTIRETY, INCLUDING**
> **DISCLOSURES THAT TEACH AWAY FROM THE CLAIMS**
> A prior art reference must be considered in its entirety, i.e., as a whole, including
> portions that would lead away from the claimed invention. *W.L. Gore &*
> *Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983),
> *cert. denied*, 469 U.S. 851 (1984)

Thus, the above teaching of Phaal further indicates that claims 7 and 29 are allowable,

because Phaal teaches away from altering anything based on the length of the sampling

queue of packets sampled, and therefore teaches away from altering the fraction of

packets sampled based on the length of the queue of packets.

Based at least on the foregoing reasons, claims 7 and 29 are allowable over the

combination of Phaal and Lo.

III. DEPENDENT CLAIMS 10, 25-26, 31, 43, AND 44

Claims 10, 25-26, 31, 43, and 44 depend either directly or indirectly on

one of claims 7 and 29. Because each of the dependant claims include the limitations of

claims upon which they depend, the dependant claims are patentable for at least those

reasons the claims upon which the dependant claims depend are patentable. Removal of

the rejections with respect to the dependant claims and allowance of the dependant claims

is respectfully requested. In addition, the dependent claims introduce additional

limitations that independently render them patentable. Due to the differences already

identified, a separate discussion of those limitations is not included at this time.

IV. DEPENDENT CLAIMS 9, 11-21, 30, AND 32-42

Each of claims 9, 11-21, 30, and 32-42 depends directly or indirectly from one of claims 7 and 29, which are allowable in view of the above arguments. Therefore, in view of the above arguments, claims 9, 11-21, 30, and 32-42 depend from allowable base claims and the objection should be withdrawn.

V. CONCLUSION

For the reasons set forth above, Applicant respectfully submits that all pending claims are patentable over the art of record, including the art cited but not applied. Accordingly, allowance of all claims is hereby respectfully solicited. No fee is believed to be due specifically in connection with this Response. To the extent necessary, the Commissioner is authorized to charge any fee that may be due in connection with this Response to our Deposit Account No. 50-1302.

The Examiner is respectfully requested to contact the undersigned by telephone if it is believed that such contact would further the examination of the present application.

Respectfully submitted,

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Dated: August 6, 2004

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